PULSE CROP ECONOMICS

ECONOMIC COMPARISON BETWEEN CROPS & ROTATIONS

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CROP ECONOMICS

Approach: Comparison of Returns After Direct Costs

Revenue = Value of Crop + Crop Insurance Revenue

- **Government payments assumed not to change with crop selection**

Direct Costs:

- **Seed**
- **Herbicides**
- **Fungicides**
- **Insecticides**
- **Fertilizer – replacement of NPK & S for yield harvested**
- **Crop Insurance**
- **Fuel & Lubrication for Field Operations**
- **Trucking from Farm to Delivery Point**
- **Operating Interest**

2013 PRICE ESTIMATES

Spring Wheat (14%)	$8.60 / bu Current Price: $8.19
Durum	$8.90 / bu Current Price: $8.03
Winter Wheat (11%)	$7.80 / bu Current Price: $7.71
Malt Barley	$6.75 / bu $14.06 / cwt Current Price: $6.12/bu $12.75/cwt
Feed Barley	$4.80 / bu $10.00 / cwt Current Price: $4.56/bu $9.50/cwt

2013 PRICE ESTIMATES

Peas	
Green *Cruiser-type* (No. 1)	$17.50 / cwt $10.50/bu Current Price: $25/cwt $15/bu
Yellow	$14.17 / cwt $8.50/bu Current Price: $15.17/cwt $9.10/bu
Lentils	
Laird (Large Green) No. 1	$20.00 / cwt $12.00/bu Current Price: $20.46/cwt $12.28/bu
Richlea (Medium Green) No. 1	$18.00 / cwt $10.80/bu Current Price: $18.00/cwt $10.80/bu
Eston (Small Green) No. 1	$21.00 / cwt $12.60/bu Current Price: $21.99/cwt $13.19/bu
Red No. 1	$18.50 / cwt $11.10/bu Current Price: $19.05/cwt $11.43/bu

2013 PRICE ESTIMATES

Chickpeas	
Kabuli 9mm (No. 1)	$35/cwt *($21/bu)* Current Price: $40/cwt $24/bu ???
Frontier	$22.50/cwt *($13.50/bu)* Current Price: 8 mm+ $31.19/cwt $18.71/bu <8mm $19.96/cwt $11.97/bu
B90	$22.50/cwt *($13.50/bu)* Current Price: $21.59/cwt $12.95/bu ???
Desi	$20/cwt *($12/bu)* Current Price: $27.82/cwt $16.69/bu ???

2013 PRICE ESTIMATES

Mustard	**$40/cwt** ***($20.80/bu)*** **Current Price: $40/cwt** ***($20.80/bu)***
Canola	**$25.00/cwt** ***($12.50/bu)*** **Current Price: $28.85/cwt** ***($14.42/bu)***
Flax	**$20.54/cwt** ***($11.50/bu)*** **Current Price: $24.79/cwt** ***($13.88/bu)***
Safflower	**$24.00/cwt** ***($9.12/bu)*** **Current Price: $28.00/cwt ????**
Alfalfa	**$110/ton Irrigated / $80 Dryland** **Current Price: $180+/ton**

YIELDS USED FOR DRYLAND:

WW	43.8 bu/acre	*(2,628 lbs/acre)*
WW-Recrop	32.0 bu/acre	*(1,920 lbs/acre)*
SW (bu/acre)	27.4 bu/acre	*(1,644 lbs/acre)*
SW-Recrop	22.0 bu/acre	*(1,320 lbs/acre)*
Durum	32.9 bu/acre	*(1,972 lbs/acre)*
Durum-Recrop	22.7 bu/acre	*(1,362 lbs/acre)*
Barley	46.4 bu/acre	*(2,227 lbs/acre)*
Barley-Recrop	35.8 bu/acre	*(1,718 lbs/acre)*
Peas	27.0 bu/acre	*(1,620 lbs/acre)*
Lentils *(Medium Green Richlea)*	20.0 bu/acre	*(1,200 lbs/acre)*
Chickpeas		
Desi	18.3 bu/acre	*(1,100 lbs/acre)*
Kabuli	15.0 bu/acre	*(900 lbs/acre)*
Canola	22.0 bu/acre	*(1,100 lbs/acre)*
Flax	15.0 bu/acre	*(840 lbs/acre)*
Safflower	22.4 bu/acre	*(850 lbs/acre)*
Mustard	12.1 bu/acre	*(627 lbs/acre)*

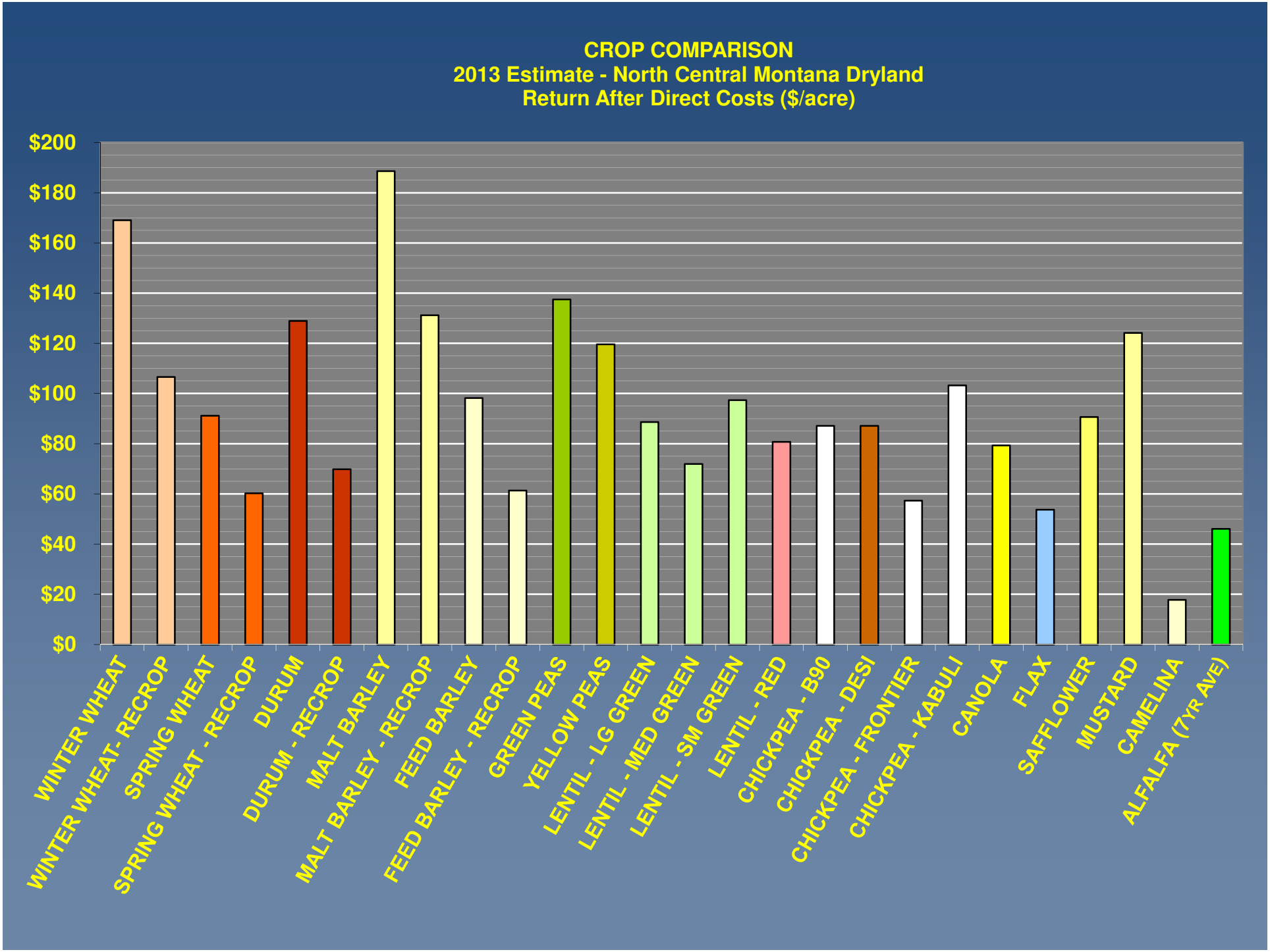
YIELDS USED FOR IRRIGATED:

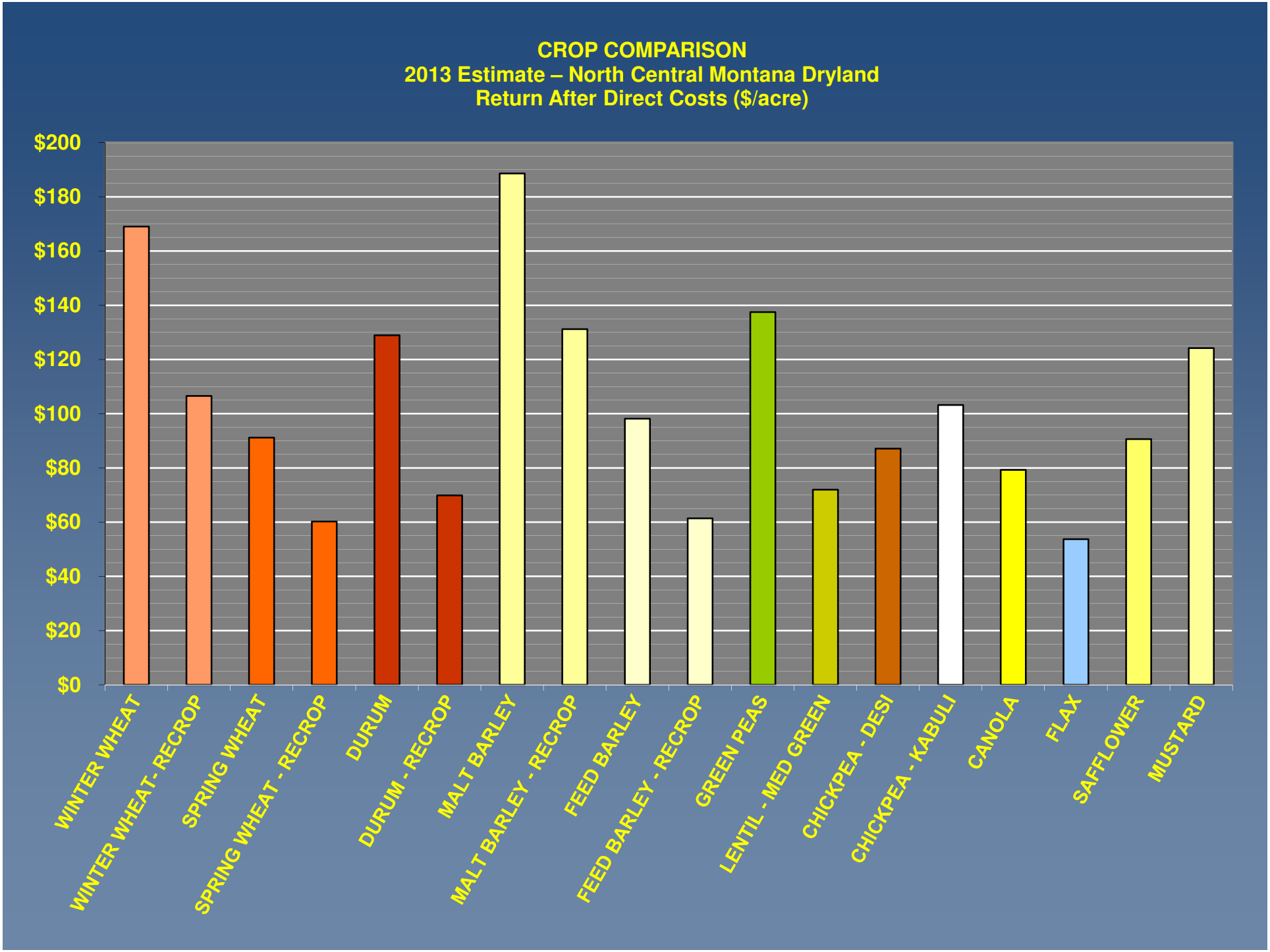
Barley	100 bu/acre	*(4,800 lbs/acre)*
WW	95 bu/acre	*(5,700 lbs/acre)*
SW	85 bu/acre	*(5,100 lbs/acre)*
Durum	80 bu/acre	*(4,800 lbs/acre)*
Peas	62.5 bu/acre	*(3,750 lbs/acre)*
Lentils	37.5 bu/acre	*(2,250 lbs/acre)*
Chickpeas (*Kabuli)*	37.5 bu/acre	*(2,250 lbs/acre)*
Canola	55 bu/acre	*(2,750 lbs/acre)*
Mustard	33.7 bu/acre	*(1,750 lbs/acre)*
Alfalfa	4.79 tons/acre	*(average for 7-Year stand)*

DRYLAND PRODUCTION

North Central Montana

2013 Crops Estimate & Rotation Comparison


CROP COMPARISON
2013 Estimate - North Central Montana Dryland
Return After Direct Costs ($/acre)
$200
$180
$160
$140
$120
$100
$80
$60
$40
$20
$0
WINTER WHEAT
WINTER WHEAT- RECROP
SPRING WHEAT
SPRING WHEAT - RECROP
DURUM
DURUM - RECROP
MALT BARLEY
MALT BARLEY - RECROP
FEED BARLEY
FEED BARLEY - RECROP
GREEN PEAS
YELLOW PEAS
LENTIL - LG GREEN
LENTIL - MED GREEN
LENTIL - SM GREEN
LENTIL - RED
CHICKPEA - B90
CHICKPEA - DESI
CHICKPEA - FRONTIER
CHICKPEA - KABULI
CANOLA
FLAX
SAFFLOWER
MUSTARD
CAMELINA
ALFALFA (7YR AVE)


CROP COMPARISON
2013 Estimate – North Central Montana Dryland
Return After Direct Costs ($/acre)
$200
$180
$160
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$40
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WINTER WHEAT
WINTER WHEAT - RECROP
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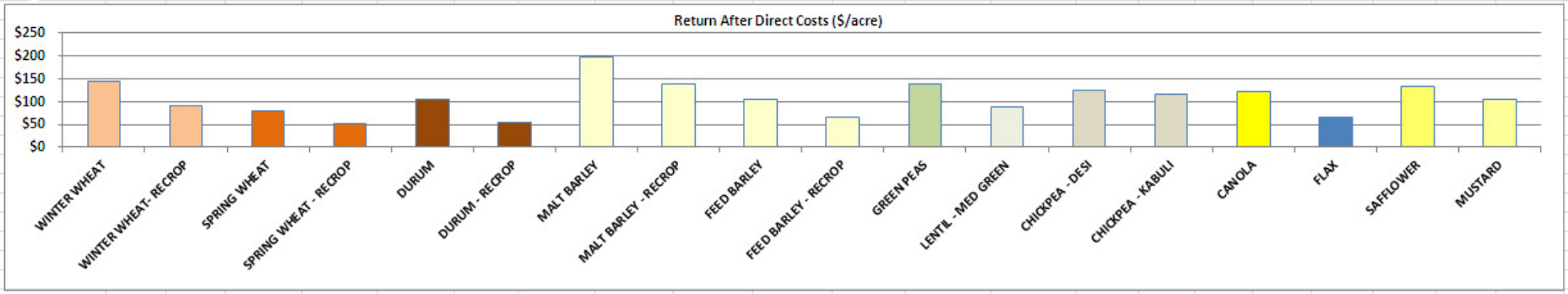
SPRING WHEAT - RECROP
DURUM
DURUM - RECROP
MALT BARLEY
MALT BARLEY - RECROP
FEED BARLEY
FEED BARLEY - RECROP
GREEN PEAS
LENTIL - MED GREEN
CHICKPEA - DESI
CHICKPEA - KABULI
CANOLA
FLAX
SAFFLOWER
MUSTARD

MONTANA DEPARTMENT OF AGRICULTURE

CROP BUDGET SPREADSHEET



Prices	Winter Wheat	Spring Wheat	Durum	Malt Barley	Feed Barley	Peas - Green	Lentils - Medium Green	Chickpeas - Desi	Chickpeas - Kabuli	Canola	Flax	Safflower	Mustard
Projected	$7.00	$8.00	$8.00	$6.80	$4.80	$10.00	$0.1700	$0.2400	$0.3500	$0.2500	$12.00	$0.2800	$0.3500
Price Analyzed	**$7.00**	**$8.00**	**$8.00**	**$6.80**	**$4.80**	**$10.00**	**$0.1700**	**$0.2400**	**$0.3500**	**$0.2500**	**$12.00**	**$0.2800**	**$0.3500**
% of Projected	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Yields	Winter Wheat - SF	Spring Wheat - SF	Durum - SF	Malt Barley - SF	Feed Barley - SF	Peas - Green	Lentils - Medium Green	Chickpeas - Desi	Chickpeas - Kabuli	Canola	Flax	Safflower	Mustard
Projected	43.82	27.40	32.90	46.40	46.40	27.00	1,200	1,200	1,000	1,250	15.00	850	627
Yield Analyzed	**43.82**	**27.40**	**32.90**	**46.40**	**46.40**	**27.00**	**1,200**	**1,200**	**1,000**	**1,250**	**15.00**	**850**	**627**
% of Projected	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Yields	Winter Wheat - Recrop	Spring Wheat - Recrop	Durum - Recrop	Malt Barley - Recrop	Feed Barley - Recrop
Projected	32.00	22.00	22.70	35.80	35.80
Yield Analyzed	**32.00**	**22.00**	**22.70**	**35.80**	**35.80**
% of Projected	**100%**	**100%**	**100%**	**100%**	**100%**

Fertilizer - Fall	N	P	K	S
Projected/Known - Fall Price	$0.67	$0.52	$0.53	$0.36
Fall Price Analyzed	**$0.67**	**$0.52**	**$0.53**	**$0.36**
% of Projected Fall Price	**100%**	**100%**	**100%**	**100%**

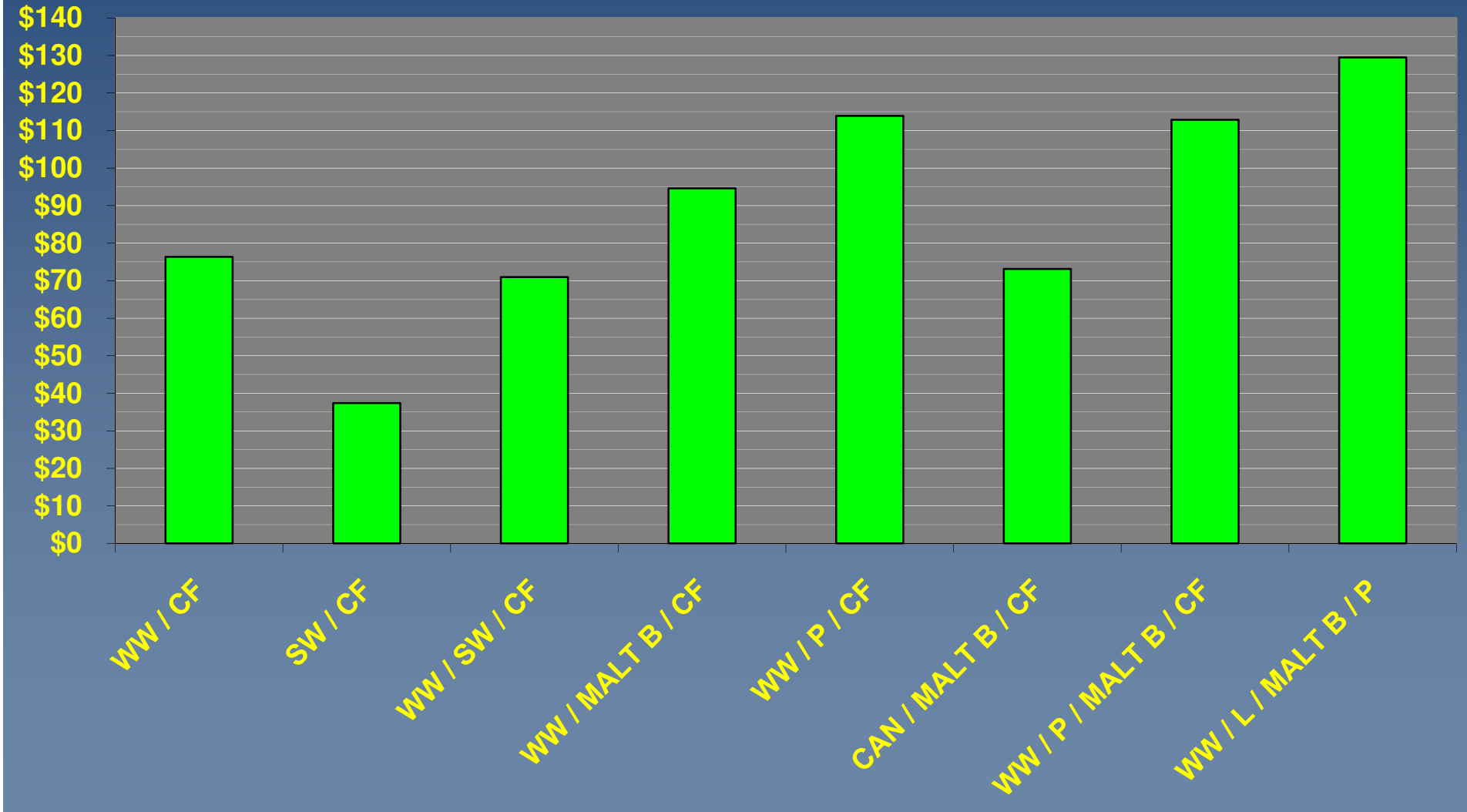
Fertilizer - Spring	N	P	K	S
Projected/Known - Spring Price	$0.67	$0.52	$0.53	$0.36
Spring Price Analyzed	**$0.67**	**$0.52**	**$0.53**	**$0.36**
% of Projected Spring Price	**100%**	**100%**	**100%**	**100%**

Fungicide Applications	Peas - Green	Lentils - Medium Green	Chickpeas - Desi	Chickpeas - Kabuli	Safflower
	0	**0**	**0**	**2**	**0**

Dryland Rotation Comparison

Average Annual Return After Direct Costs

2013 Estimate – North Central Montana Dryland

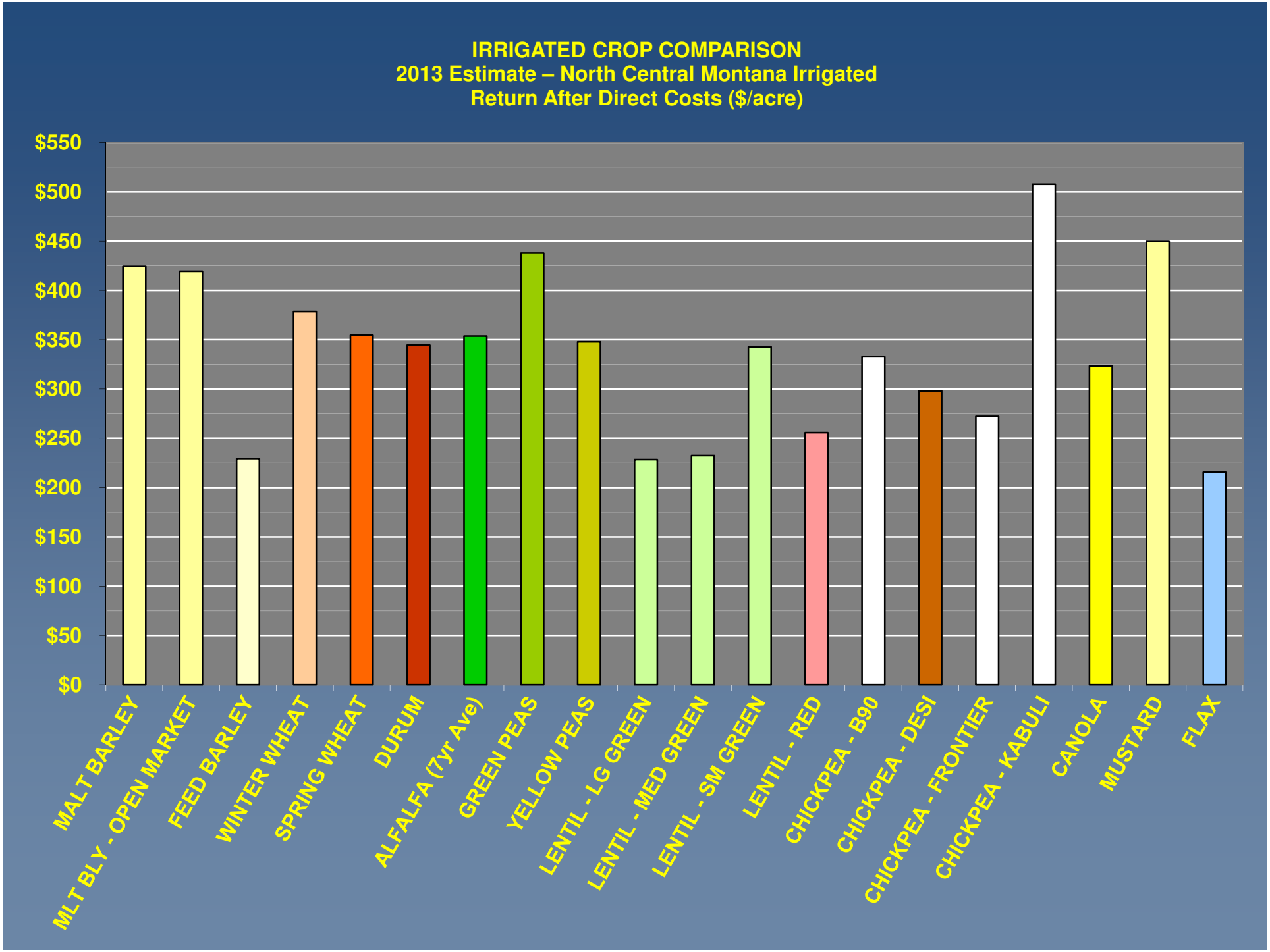


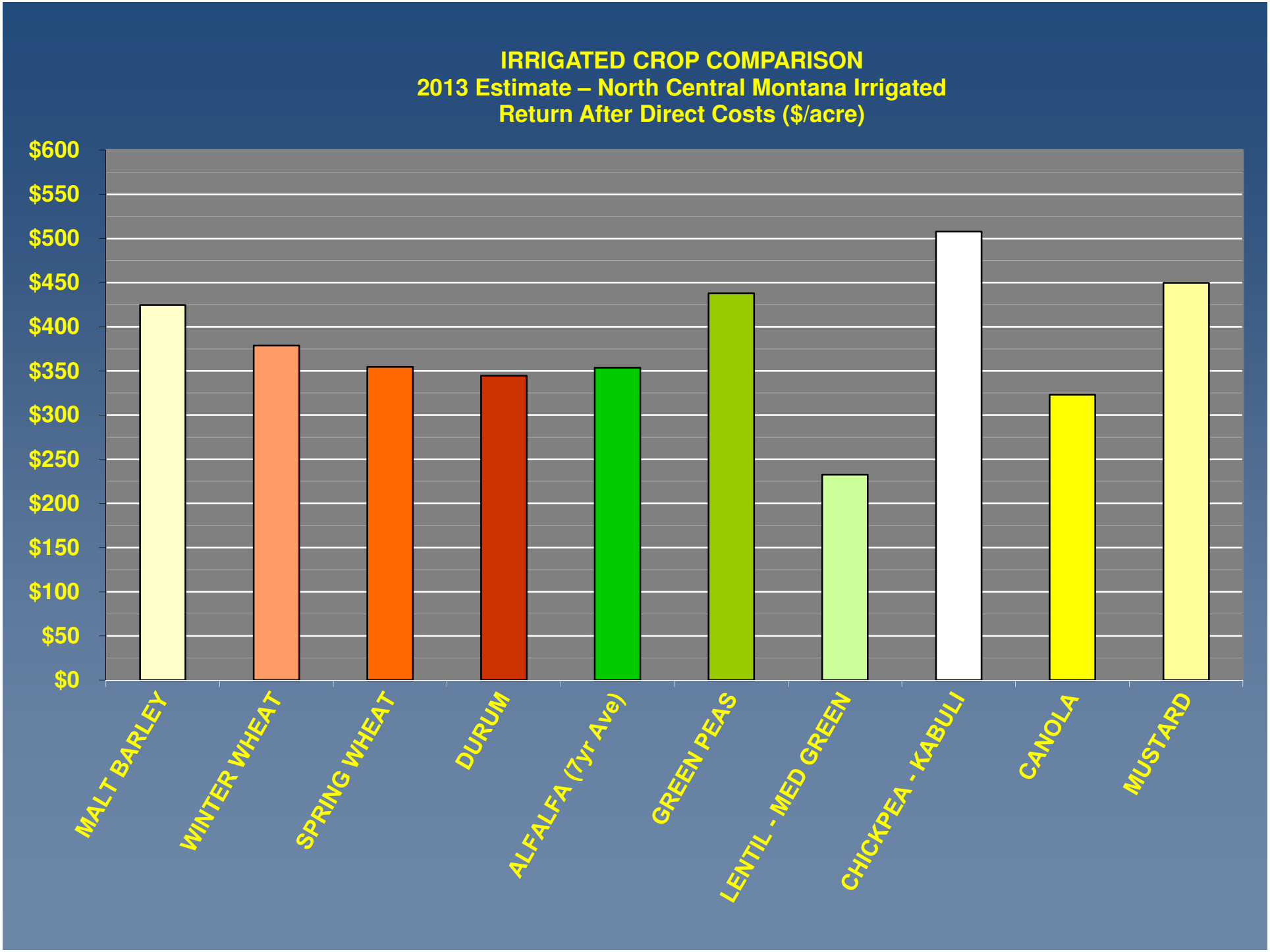
CROP ECONOMICS

IRRIGATED PRODUCTION

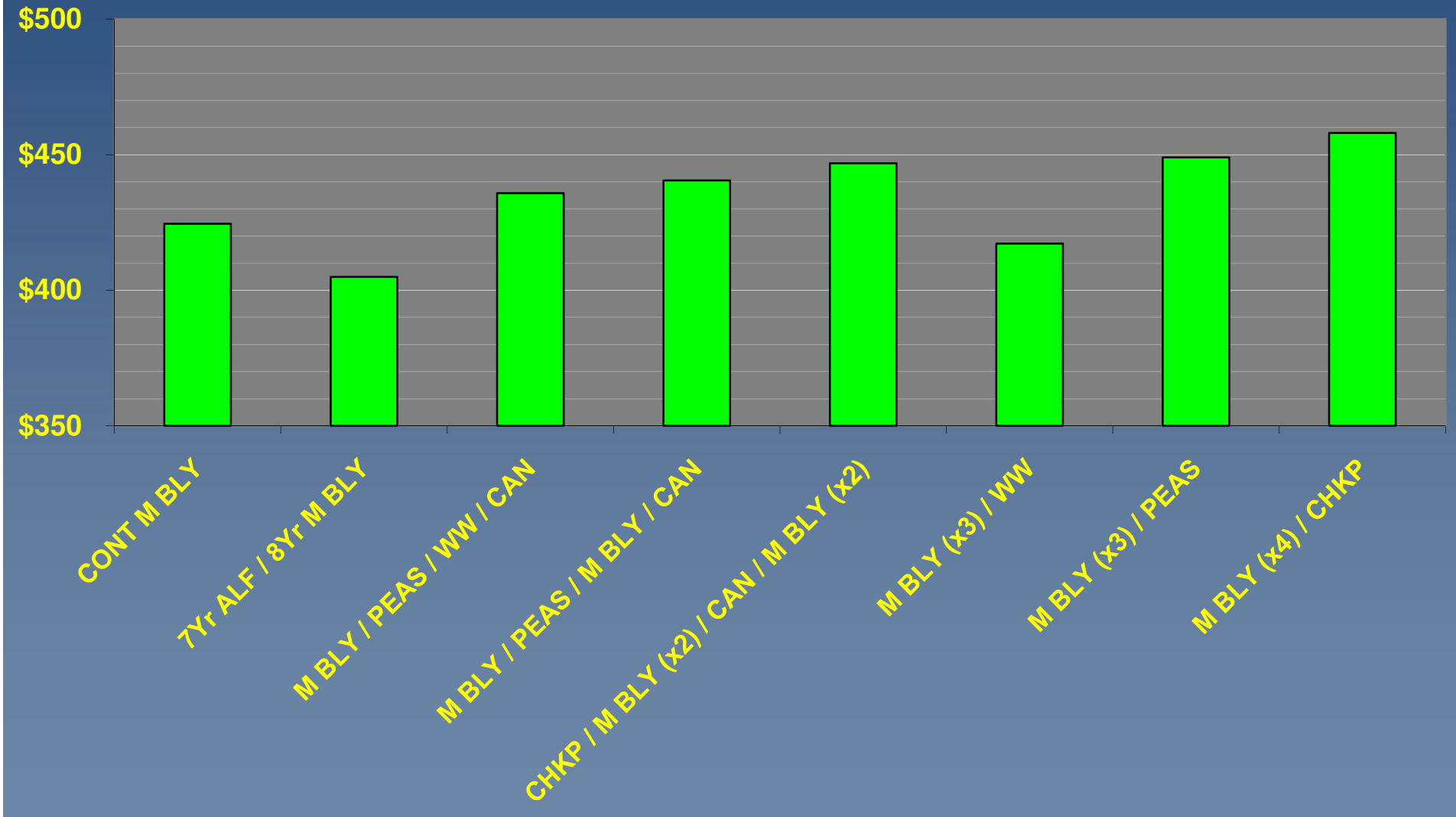
North Central Montana

2013 Crops Estimate


IRRIGATED CROP COMPARISON
2013 Estimate – North Central Montana Irrigated
Return After Direct Costs ($/acre)
$550
$500
$450
$400
$350
$300
$250
$200
$150
$100
$50
$0
MALT BARLEY
MLT BLY - OPEN MARKET
FEED BARLEY
WINTER WHEAT
SPRING WHEAT
DURUM
ALFALFA (7yr Ave)
GREEN PEAS
YELLOW PEAS
LENTIL - LG GREEN
LENTIL - MED GREEN
LENTIL - SM GREEN
LENTIL - RED
CHICKPEA - B90
CHICKPEA - DESI
CHICKPEA - FRONTIER
CHICKPEA - KABULI
CANOLA
MUSTARD
FLAX


IRRIGATED CROP COMPARISON
2013 Estimate – North Central Montana Irrigated
Return After Direct Costs ($/acre)
$600
$550
$500
$450
$400
$350
$300
$250
$200
$150
$100
$50
$0
MALT BARLEY
WINTER WHEAT
SPRING WHEAT
DURUM
ALFALFA (7yr Ave)
GREEN PEAS
LENTIL - MED GREEN
CHICKPEA - KABULI
CANOLA
MUSTARD

Rotation Comparison
Average Annual Return After Direct Costs
2013 Estimate – North Central Montana Irrigated



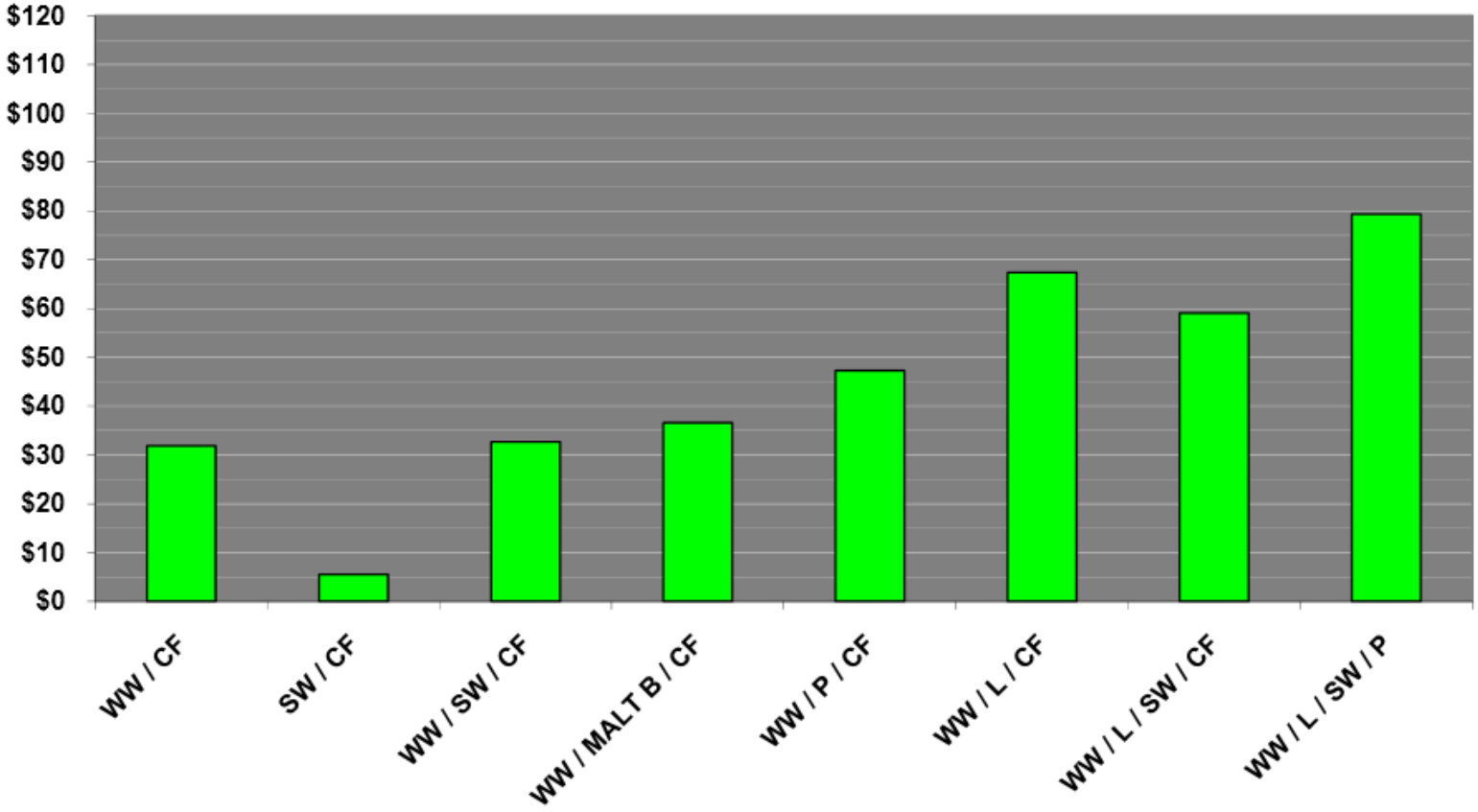
COULD THE EXPANDING PULSE INDUSTRY INCREASE DISCUSSION AND COLLABORATION BETWEEN LANDLORDS & TENNANTS?

ARE TRADITIONAL CROP SHARE RENTAL AGREEMENTS AN OBSTACLE TO PULSE GROWTH?

Rotation Comparison

Average Annual Return After Direct Costs

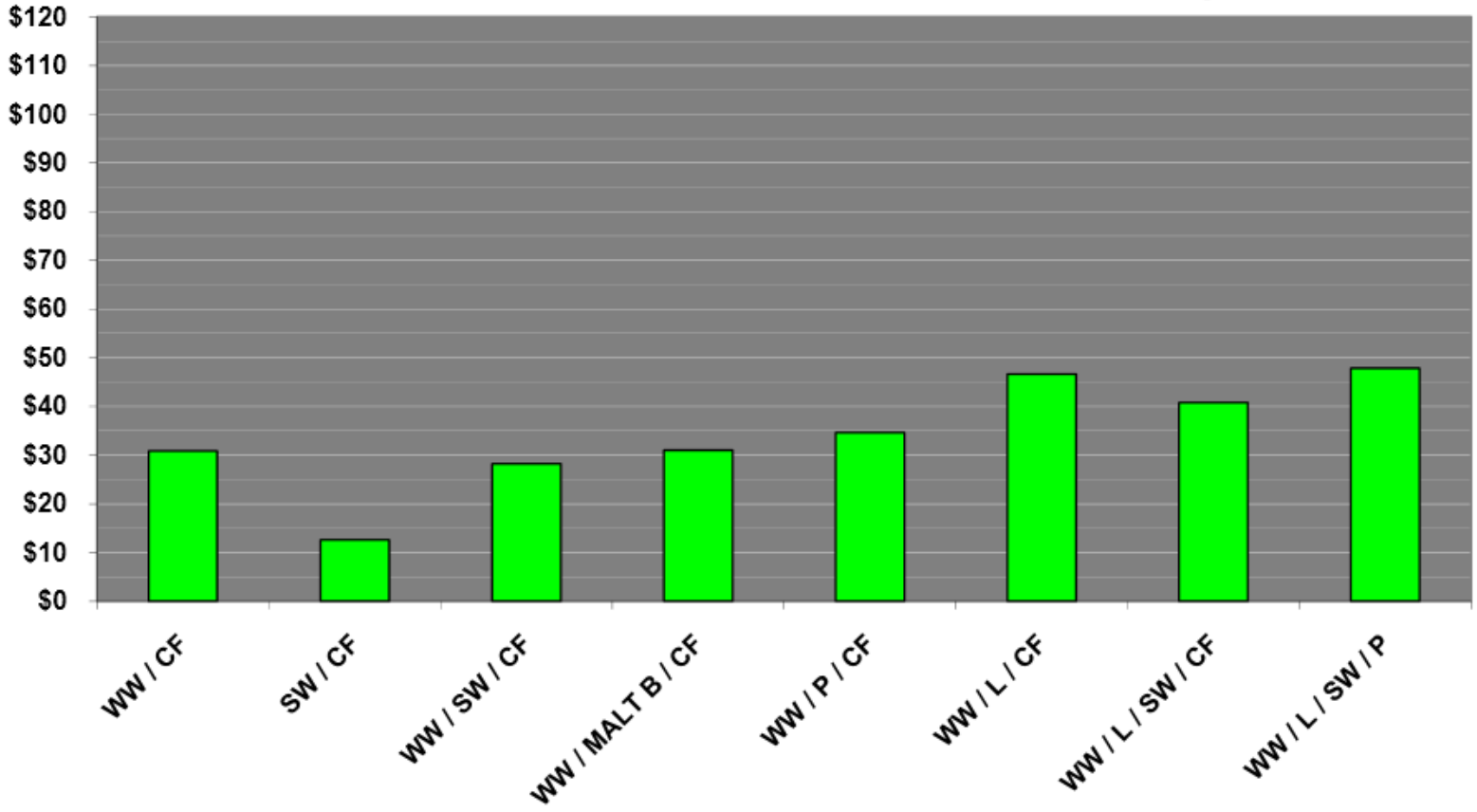
2011 Estimate - $35/acre Cash Lease



Rotation Comparison

Average Annual Return After Direct Costs

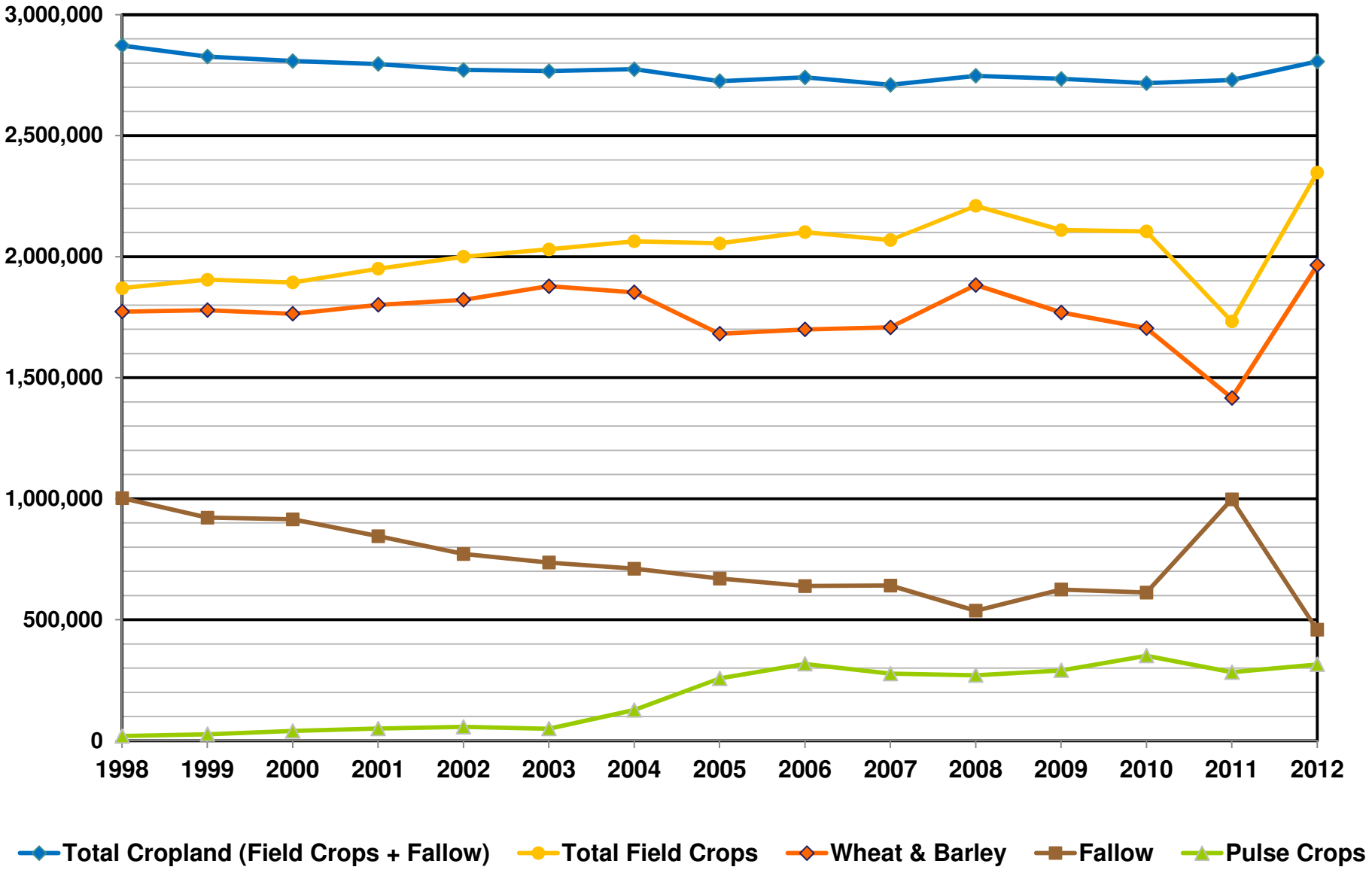
2011 Estimate - 2/3:1/3 Revenue/Fertilizer Crop Share



Northeastern Montana *(1998 – 2011)*

Replacement of Fallow with Pulse Crops

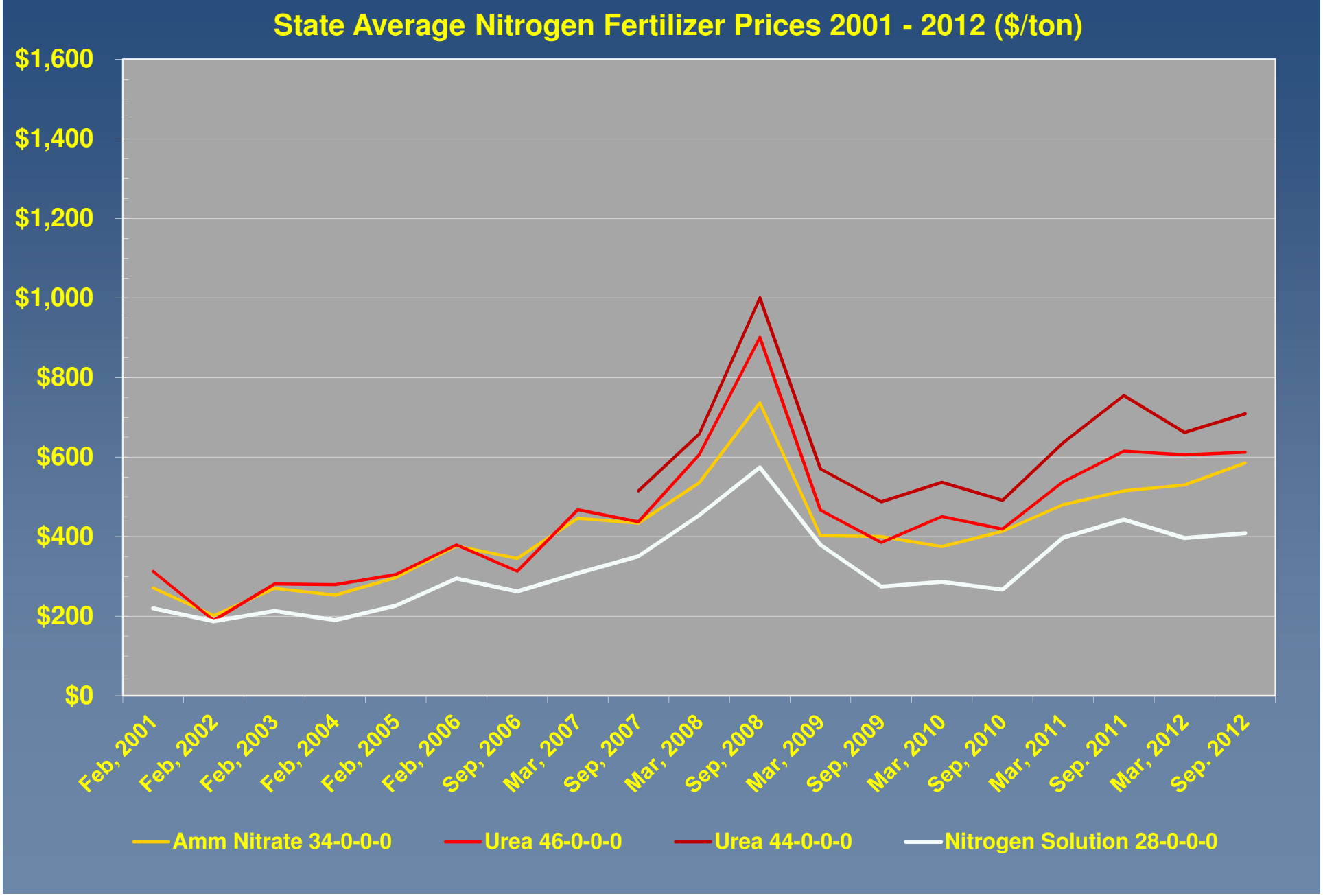
NORTHEASTERN MONTANA DRYLAND CROP STATISTICS
1998 - 2012 (acres)

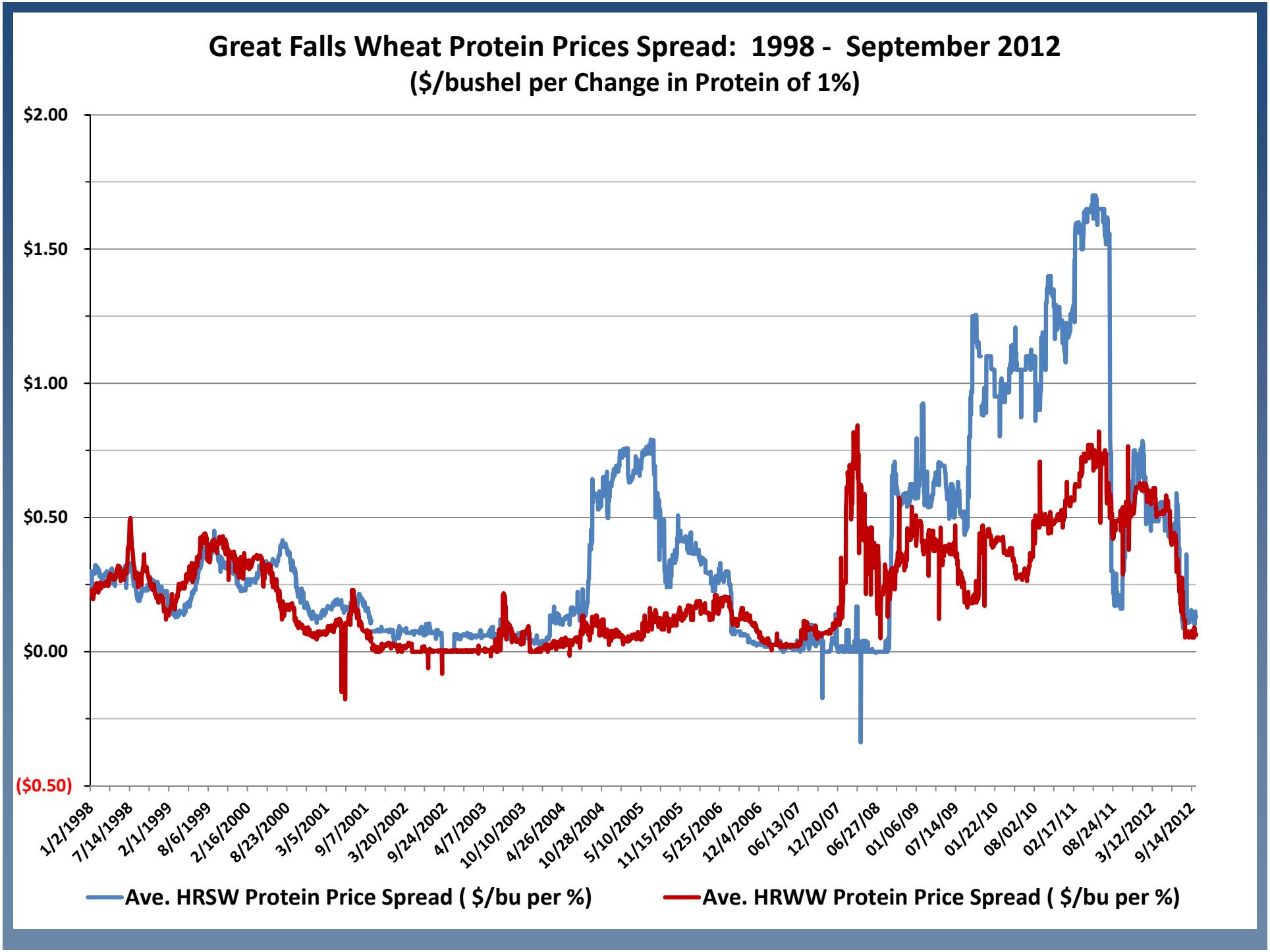


WHY PULSE PRODUCTION WILL CONTINUE TO EXPAND IN MONTANA

- Capacity to enable intensifying crop rotations, reducing fallow
- Competitive economics vs. other crops
- Increasing fertilizer prices
- Need for crop diversification to address disease, pest, and weed problems
- Possible diversification of production and market volatility
- Increased number of buyers and delivery points

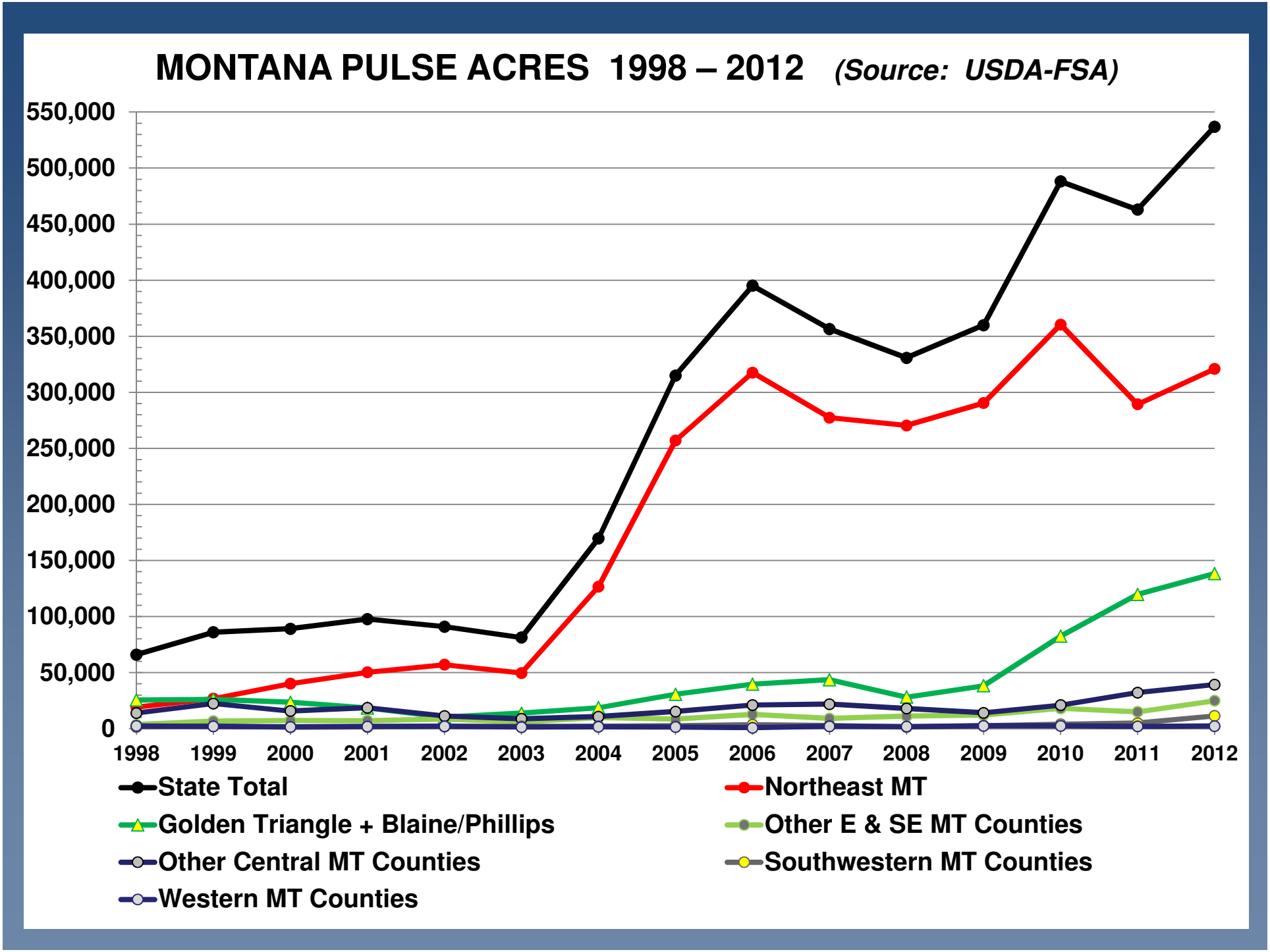
Montana Nitrogen Fertilizer Prices:




Great Falls Wheat Protein Prices Spread: 1998 - September 2012
($/bushel per Change in Protein of 1%)
$2.00
$1.50
$1.00
$0.50
$0.00
($0.50)
1/2/1998
7/14/1998
2/1/1999
8/6/1999
2/16/2000
8/23/2000
3/5/2001
9/7/2001
3/20/2002
9/24/2002
4/7/2003
10/10/2003
4/26/2004
10/28/2004
5/10/2005
11/15/2005
5/25/2006
12/4/2006
06/13/07
12/20/07
06/27/08
01/06/09
07/14/09
01/22/10
08/02/10
02/17/11
08/24/11
3/12/2012
9/14/2012
Ave. HRSW Protein Price Spread ($/bu per %)
Ave. HRWW Protein Price Spread ($/bu per %)

HOW DOES THIS PERTAIN TO WHEAT & BARLEY?

- Yield Benefit
- Quality Benefit: protein, test weight, plump
- Addresses certain disease and weed issues
- Possible changes in crop rotations
  - how might moving to 4-year rotations from 2-3 year crop rotations impact recrop barley, spring wheat and winter wheat?
- For Montana farmers: increased competition between crops and buyers for acres is a good thing
- Pulse industry may be a catalyst for containerized shipping from Montana
  - May open up new premium markets for identity-preserved wheat and barley
  - Might increase the number of buyers of Montana wheat and barley


MONTANA PULSE ACRES 1998 – 2012 (Source: USDA-FSA)
550,000
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
State Total
Northeast MT
Golden Triangle + Blaine/Phillips
Other E & SE MT Counties
Other Central MT Counties
Southwestern MT Counties
Western MT Counties

MARKET DYNAMICS – WHY THE PULSE MARKET WILL CONTINUE TO EXPAND

- World Population and Economic Growth
- Product Substitution
- Weather
- Globalization
- Value of the U.S. Dollar relative to Canadian and Australian currency
- Opportunity in Domestic & Developed-World Markets
  - Pulse Fiber / Starch / Protein / Micronutrients: addressing health/dietary needs of consumers and functional needs of food manufacturers
  - Nonallergenic Qualities
  - Pulse Product Development
- Sustainability

India: Largest Producer, Consumer, Importer of Pulse Crops

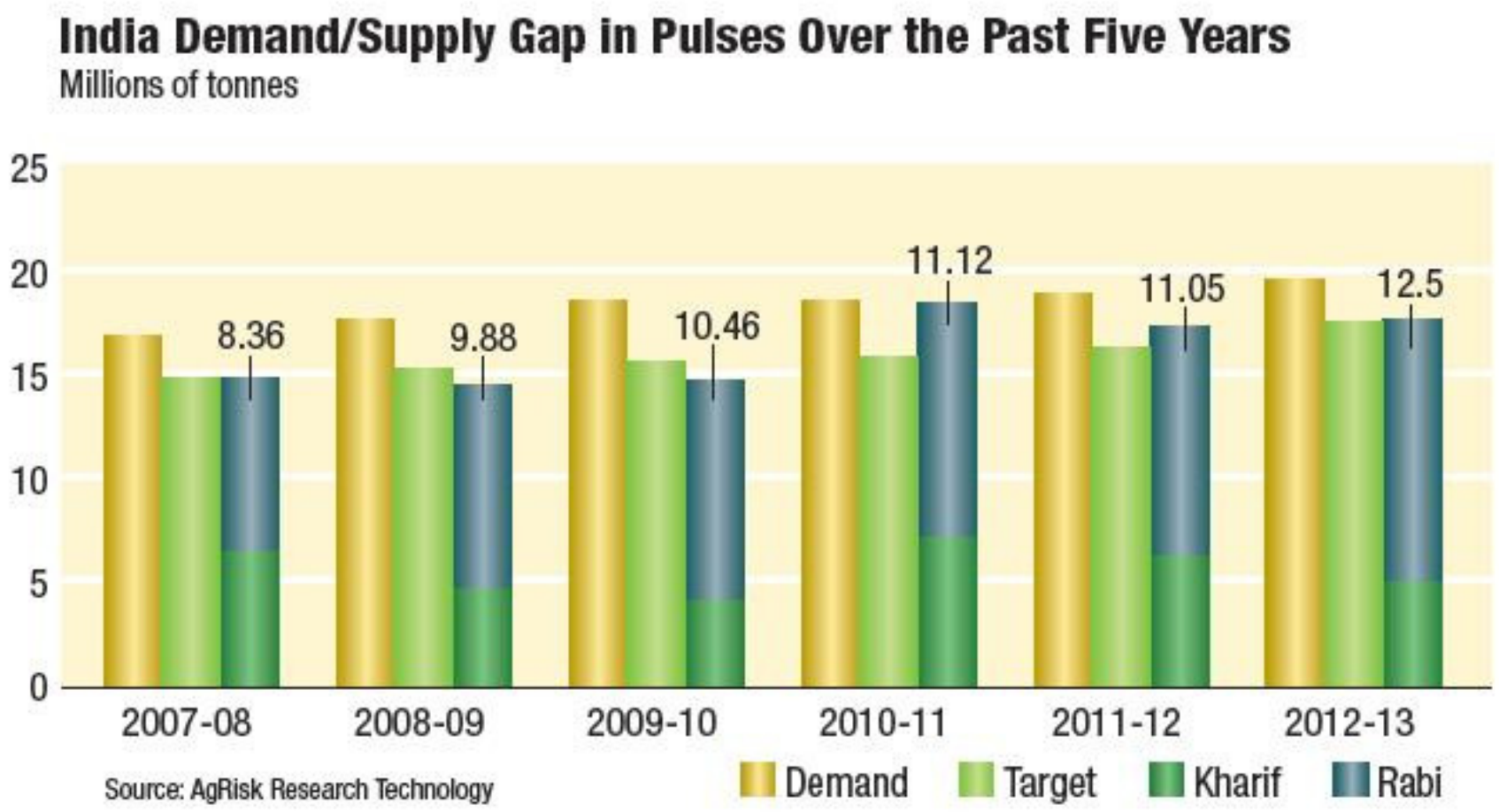
- **Production: Over 50 million acres of pulse crops**
  - about 3.7 million acres of lentils
  - 63% of pulses grown in the winter season

- **Consumption: should be 22 million metric tons (to meet dietary recommendations)**
  - Production from two harvests is about 16 million metric tons
  - Gap (recommended consumption vs production) has doubled every decade in the last 30 years
  - In the last 10 years, the gap has averaged 5.3 million metric tons/yr

- **Imports: Normally imports about 3 million metric tons**

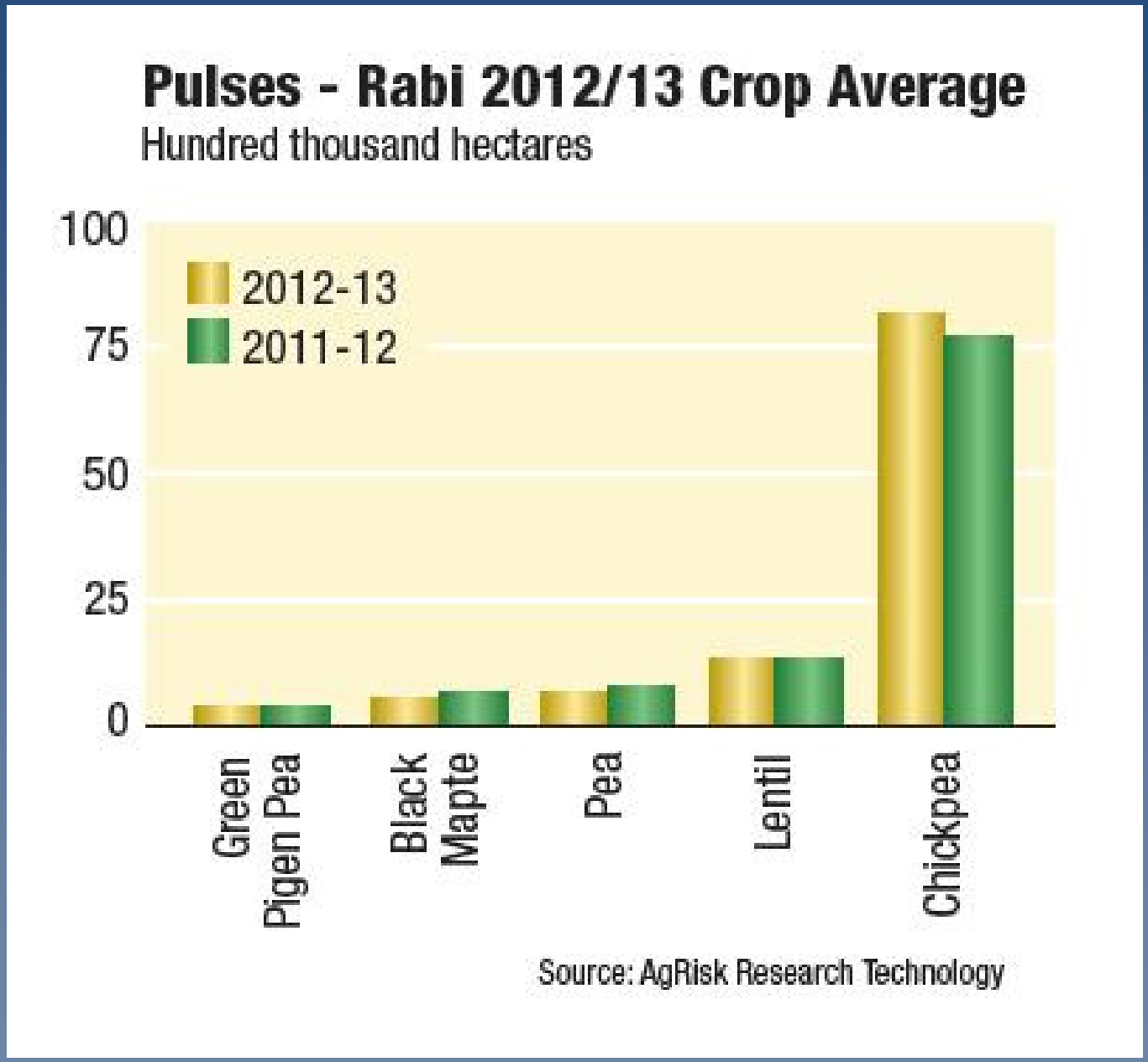
Source: March 2010 Saskatchewan Pulse Growers Association Market Report, Martin Chidwick, Bissma Pacific, Inc.

India Pulse Production / Demand:



Source: February 2013 Saskatchewan Pulse Growers Association Market Report

India Rabi Crop Acreage:



Source: February 2013 Saskatchewan Pulse Growers Association Market Report

Canada Pea & Chickpea Projections:

Supply and Demand Estimate for Canadian Chickpeas and Field Peas in 2012/13						
	Desi	Kabuli	Small Kabuli	Yellow	Green	Other
Area (acres)	5,000	171,000	24,000	2,900,000	400,000	40,000
Yield (lbs/acre)	1,323	1,735	1,828	1,881	1,805	1,538
Production	3,000	134,600	19,900	2,474,300	327,500	27,900
Carry In	100	7,900	3,000	271,400	2,200	1,400
Imports	0	7,000	0	11,700	19,100	0
Supply	3,100	149,500	22,900	2,757,400	348,800	29,300
Exports	2,050	58,000	7,350	2,069,100	249,800	16,100
Seed	200	10,100	1,800	200,000	38,000	3,000
Feed, Waste and Other	250	41,000	10,750	231,300	31,000	7,200
Total Usage	2,500	109,100	19,900	2,500,400	318,800	26,300
Ending Stocks	600	40,400	3,000	257,000	30,000	3,000
Stocks/Use	24%	37%	15%	10%	9%	11%

*All quantities in tonnes

Source: STAT Publishing

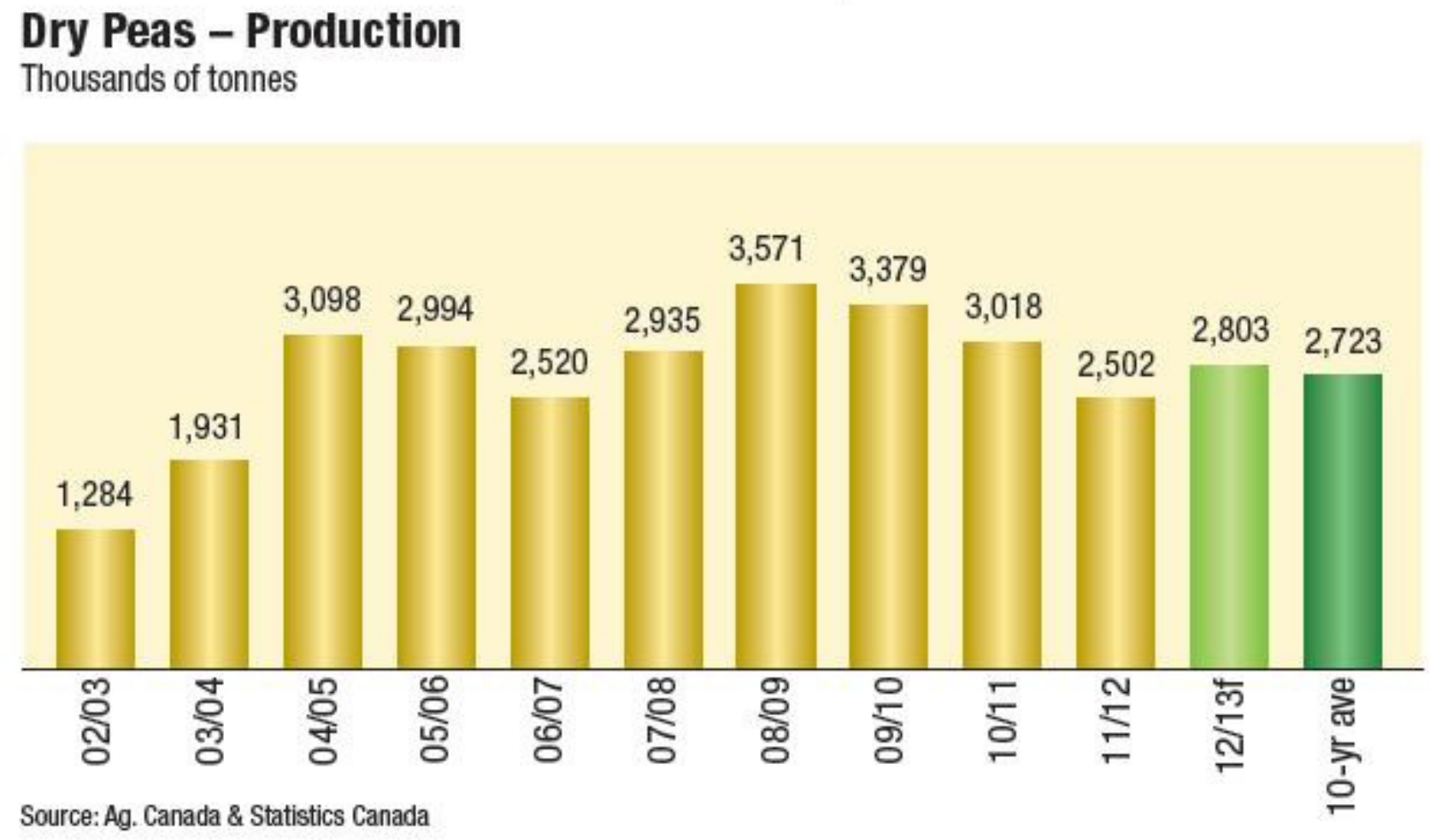
Supply and Demand Forecast for Canadian Chickpeas and Field Peas in 2013/14						
	Desi	Kabuli	Small Kabuli	Yellow	Green	Other
Area (acres)	6,000	125,000	33,000	2,839,200	542,100	41,700
Yield (lbs/acre)	1,102	1,570	1,537	1,940	2,033	1,850
Production	3,000	89,000	23,000	2,498,200	499,800	35,000
Carry In	600	40,400	3,000	257,000	30,000	3,000
Imports	0	7,000	0	12,100	18,900	100
Supply	3,600	136,400	26,000	2,767,300	548,700	38,100
Exports	2,500	56,000	10,700	1,850,600	366,900	25,500
Seed	100	7,700	1,400	206,000	34,000	4,000
Feed, Waste and Other	1,000	39,000	7,600	326,700	64,800	3,600
Total Usage	3,600	102,700	19,700	2,383,300	465,700	33,100
Ending Stocks	0	33,700	6,300	384,000	83,000	5,000
Stocks/Use	0%	33%	32%	16%	18%	15%

*All quantities in tonnes

Source: STAT Publishing

Source: February 2013 Saskatchewan Pulse Growers Association Market Report

CANADA PEA PRODUCTION



Source: January 2013 Saskatchewan Pulse Growers Association Market Report

Canada Lentil Projections:

Supply and Demand Estimate for Canadian Lentils in 2012/13						
	Large Green	Medium Green	Small Green	X-Small Red	Small Red	Other
Area (acres)	1,230,000	65,000	260,000	48,000	902,000	10,000
Yield (lbs/acre)	1,350	1,119	1,348	1,360	1,205	1,102
Production	753,200	33,000	159,000	29,600	493,000	5,000
Carry In	236,000	11,000	36,000	72,000	326,000	2,000
Supply	989,200	44,000	195,000	101,600	819,000	7,000
Exports	556,500	31,100	115,600	60,200	510,600	4,200
Seed	32,400	1,500	4,000	1,100	29,300	200
Feed, Waste and Other	84,300	3,400	16,400	9,300	70,100	600
Total Usage	673,200	36,000	136,000	70,600	610,000	5,000
Ending Stocks	316,000	8,000	59,000	31,000	209,000	2,000
Stocks/Use	47%	22%	43%	44%	34%	40%

*All quantities in tonnes

Source: STAT Publishing

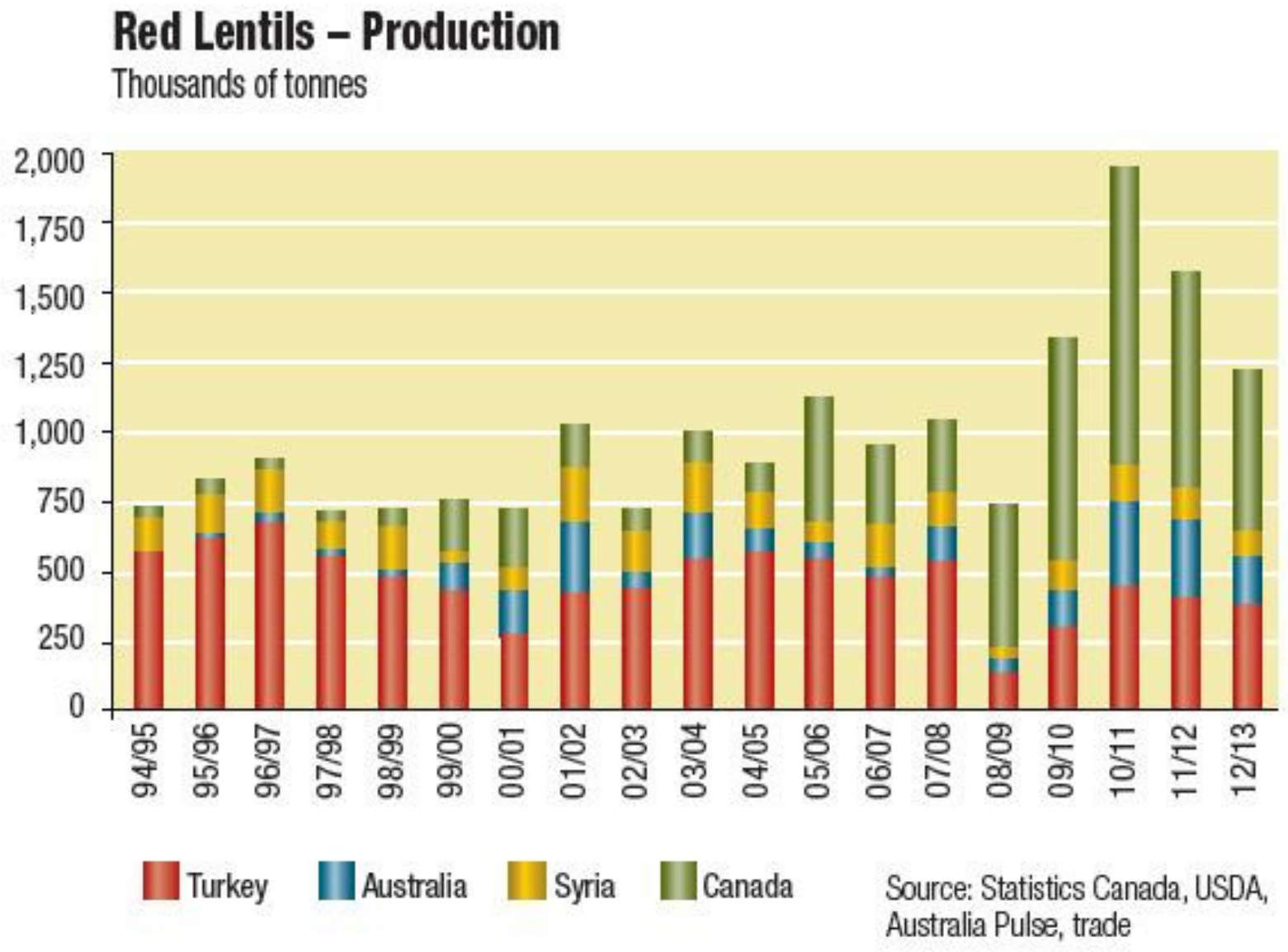
Supply and Demand Forecast for Canadian Lentils in 2013/14						
	Large Green	Medium Green	Small Green	X-Small Red	Small Red	Other
Area (acres)	793,000	47,000	178,000	49,000	924,000	9,000
Yield (lbs/acre)	1,298	1,173	1,362	1,530	1,265	980
Production	467,000	25,000	110,000	34,000	530,000	4,000
Carry In	316,000	8,000	59,000	31,000	209,000	2,000
Supply	783,000	33,000	169,000	65,000	739,000	6,000
Exports	513,700	21,600	110,900	42,600	484,700	3,900
Seed	38,300	1,800	4,600	1,300	34,800	200
Feed, Waste and Other	64,000	3,600	14,500	6,100	60,500	900
Total Usage	603,000	27,000	125,000	50,000	576,000	4,000
Ending Stocks	180,000	6,000	44,000	15,000	163,000	2,000
Stocks/Use	30%	22%	35%	30%	28%	50%

*All quantities in tonnes

Source: STAT Publishing

Source: February 2013 Saskatchewan Pulse Growers Association Market Report

GLOBAL RED LENTIL PRODUCTION



Source: January 2013 Saskatchewan Pulse Growers Association Market Report

To Discuss More, Contact:

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http://agr.mt.gov/agr/Programs/Commodities/CropTools/

MONTANA Department of AGRICULTURE